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Sgoifo, Andrea; de Boer, Sietse; Musso, Ezio; Koolhaas, Jaap

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Plasma catecholamines and corticosterone responses to three different stressful events in male rats (*Rattus norvegicus*)

ANDREA SGOIFO
Dipartimento di Biologia e Fisiologia generali
Sezione Fisiologia, Università di Parma
viale delle Scienze, I-43100 Parma (Italy)

SIETSE DE BOER
Department of Animal Physiology, University of Groningen
Kerklaan P. O. Box 14, 9750 AA Haren (The Netherlands)

EZIO MUSSO
Dipartimento di Biologia e Fisiologia generali
Sezione Fisiologia, Università di Parma
viale delle Scienze, I-43100 Parma (Italy)

JAAP KOOLHAAS
Department of Animal Physiology, University of Groningen
Kerklaan P. O. Box 14, 9750 AA Haren (The Netherlands)

Stressful situations are known to activate both the sympatho-adrenomedullary system and the pituitary-adrenocortical axis, as shown by elevated plasma concentrations of catecholamines (*CAs*) and corticosterone (*CS*). This paper reports preliminary results on stress hormones responses to three different acute environmental challenges: 1) novelty stress (*NS*, 1-min presentation of a novel object; N = 6); 2) conditioned emotional stress (*CES*, 15-min presentation of a known noxious stimulus; N = 8); 3) social stress (*SS*, 15-min defeat experience; N = 10). Blood samples of 0.5 ml were taken from freely moving adult male rats (*Rattus norvegicus*, wild type), via chronically implanted heart catheter externalized on top of the skull. Samples were withdrawn before, during and after the test (at t = −10, t = −1, t = 1, t = 5, t = 15, t = 30 and t = 60 min). Plasma CS concentrations were determined by means of reversed-phase high-performance liquid chromatography (HPLC), CAs concentrations via HPLC in combination with electrochemical detection. Variations in hormone levels were statistically analyzed by means of ANOVA and Dunnett or Tukey post-hocs (level of significance $p < 0.05$). NS provoked significant elevations of CAs as compared to control corresponding values (*CTR* rats, N = 7), until t = 5 min sample for noradrenaline (*NA*) and t = 15 min sample for adrenaline (*A*). CES induced significant elevations of A only, lasting for all the duration of the test. SS determined significant elevations of the three hormones for all the duration of the test (also extended to post-test samples in the case of corticosterone). In both novelty and conditioned emotional stress tests, max peaks were observed at t = 1 min for CAs and t = 15 min for CS. In the case of social stress, max peaks were documented at t = 5 min for CAs, at t = 30 min for CS. Cross comparison of the three environmental challenges revealed that: a) NA, A and CS increases were not significantly different between NS and CES; b) NA elevations were significantly higher in SS as compared to CES and NS at t = 1, t = 5 and t = 15 min; c) A changes were significantly higher in SS as compared to CES only, at t = 5 and t = 15 min; d) CS increases were markedly higher in SS as compared to NS and CES during both the test and post-test. The combination of unpredictability, uncontrollability and higher somatomotor activity during SS as compared to NS and CES can explain the much higher rate of stress hormones response.